

SUPPLEMENT.

The Mining Journal, RAILWAY AND COMMERCIAL GAZETTE:

FORMING A COMPLETE RECORD OF THE PROCEEDINGS OF ALL PUBLIC COMPANIES.

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Original Correspondence.

COAL MINING IN THE COUNTY OF DURHAM.

PAGE BANK, or SOUTH BRANCEPETH COLLIERY, adjoining to the Brancepeth, Byers-green, and Whitworth Collieries, became the property of Messrs. Bell Brothers, the great ironmasters, in 1864, and is under the management of Mr. A. L. Steavenson. The mineral property, leased from Lord Boyle and Dr. Fenwick, is about 3000 acres, the Brancepeth coal (Lord Boyle's) being worked by outcrop from the Page Bank property, on which the pits are situated. Two pits are sunk to the Brockwell seam to the depth of 45 fathoms, about 20 yards apart. The downcast, being used for raising coal and pumps, is 12½ ft. diameter; the upcast, 9 ft. in diameter, is used exclusively as an air-pit. The ventilation of the mine is effected by the machine of Lemielle placed at the top of it. The working of coal as commenced at Page Bank in the year 1856, with only one pit (the present downcast), divided into three parts by wood brattice, which served all the purposes of raising coal, pumping water, and ventilation. Two of these divisions were used as downcast shafts, including the pump-shaft, and the other as an upcast from the furnace, placed near the bottom of it. The return was diverted about half-way up, through a drift into a staple at the side of the engine-house. The brattice was ignited from the furnace a short time after, and entirely destroyed for ventilating purposes. This accident caused 40 men to be immured for two days. Immediately after the accident the second pit was sunk for a furnace-pit. Furnace power was the first used for ventilation until the year 1866, when the Lemielle ventilator was adopted, and has been in continual operation to the present time. The principle of ventilation now adopted is one downcast pit and one upcast, appropriated solely as an air-pit, and on which the mechanical ventilator is erected for the exhaustion of air. Setting aside the particular kind of mechanical ventilator to be adopted, this principle is now fully recognised in the Durham coal mines, and is practical operation at several collieries; but we may observe that the Guibal fan enjoys the greatest favour, though it is not probable that a ventilator of the piston form may come into use, especially in mines where heavy drags have to be overcome.

STEAM-ENGINES AND SURFACE PLANT.—There are altogether ten engines in operation—seven fixed at the surface, one locomotive, and one underground. The engines are all high-pressure, and non-condensing, and comprise the winding beam-engine: it has a 30-inch cylinder, 6-foot stroke, direct-acting, with cylindrical drum for round re-ropes, 14 feet in diameter. It is furnished with a foot-break, a strap acting on the under half of the fly-wheel, and a chain and indicator. This engine raises 700 tons of coal per day on an average. The cages are single-decked, carrying each two tubs, end to end; they are fitted with Calow's safety-catches. There are nine plain cylindrical boilers, 51 feet by 5 feet, each suspended from three cast-iron girders; these supply steam to the whole of the fixed engines, both above and underground; a pressure of 32 lbs. per inch is maintained in them. Seven of the boilers have Juckes' revolving fire-applicators to them; these are moved by a direct-acting 9-inch horizontal engine, 12-inch stroke, which also feeds the boilers with water. The boilers are covered with a non-conducting composition. A pumping-engine has one 30-inch horizontal cylinder, 5-foot stroke, direct acting. It is connected to the pump-ropes by means of a horizontal connecting-rod, and two quadrants, one on each side the pit; it works two 18-inch bucket-lifts from the depth of 51 fms., including a sump 6 fathoms deep; the lower lift is 16 fms., upper lift 35 fms. in length, delivering at the surface. This engine goes day and night at the rate of six strokes per minute, and is afforded by experiment above 70 per cent. of useful effect. There are three coal screens. In addition to the coal which passes through, part of the large coal which passes over two of the screens is crushed preparatory to being coked; the small and crushed coal accumulates in a hopper under the screens, from which the coal is taken into hopper wagons underneath it. These wagons are afterwards raised on an incline to the level of the top of the coke ovens. A 14-inch horizontal engine, 2-foot stroke, with a 5-foot drum second motion. The two coal-crushers are put in motion by a 6½-hp. horizontal direct-acting engine, 20-in. stroke, with belts shafting: 170 coke ovens are erected, and others are in course of being: they are dome-shaped, 11 ft. in diameter, charged at the top and drawn by hand labour. The ovens are built in three double rows, and are provided with spacious main flues and seven high chimneys, which prevent altogether any nuisance from smoke. The coke produced is of first-class quality, for the making of which the coal is best adapted.

An excellent bed of fire-clay is found underneath the Brockwell seam, from which fire-bricks are manufactured to the extent of 25,000 per day. The machinery comprises two stones for crushing, 6 ft. in diameter, 14 in. wide, a bucket elevator to the riddle, and pug-mill; these are driven by an engine, with an 18-in. horizontal cylinder, 6-foot stroke. The shed in which the bricks are moulded and dried is 70 ft. in length, 48 ft. in width; the flues under it are heated principally by the waste heat from the kilns. The kilns are built in a line; six of these are round, and will hold about 20,000 ordinary bricks. These have several fires outside, with flues continued upwards in the interior; the draught from these tends to flues in the bottom of the kiln. Other four kilns are of oblong form, and will contain about 10,000 bricks, having three fires in front of each. Besides the ordinary form of bricks used for lining of coke-ovens, and squares for the floors, bricks of a large size are made for the lining of blast-furnaces; these are used entirely at the Clarence Works, near Middlesbrough, belonging to Messrs. Bell Brothers, and are found to equal in durability any fire-brick that they have hitherto used.

UNDERGROUND WORKINGS.—The working of the Brockwell seam was almost confined to the Brancepeth property. The seam averages 3 ft. in thickness of clean coal, with moderately good roof; underneath is a hard fire-clay of pure quality. The dip of the measures varies, about 1 in. per yard eastward is an average. The haulage on the main east plane, 1½ mile in length from the pit, a branch in a north and east direction, 1200 yards in length, and another south branch, is all effected by an engine with two 22-inch horizontal cylinders, 3-ft. stroke, on second motion, wheels in the ratio of 1 to 2½. Two drums (on the same shafts with the spur-wheels) are 5½ ft. in diameter, and 63 wagons are drawn in and out

alternately by means of main and tail ropes, the drums being put in and out of gear alternately by slide carriages at one side. The engine is placed about 40 yards west of the pit, in a direct line with the east plane. In the workings beyond the engine-roads 28 putting-ponies are used, where the roads are little higher than the thickness of the seam. Another engine for pumping water is placed in front of the hauling-engine, with one 17-inch horizontal cylinder, 3-ft. stroke, on second motion. It pumps water in two lifts from the extremity of the east drifts, a distance of 2350 yards, by means of four 5-ft. clip wheels and two endless wire-ropes. The lower lift has 600 yds. of suction pipes up to the pumps; these are two double-acting pumps, with 8-inch plungers, forcing water 600 yards through 9-in. pipes to the upper lift, which is also worked by two double-acting 8-inch plungers; these pumps have 300 yards of suction-pipes, and 850 yards of 9-in. main pipes extending to the pit. To give motion to the upper pumps a clip-wheel at the engine, and another at the pump, and an endless rope are used. Another clip-wheel by the side of the last-named, and a clip-wheel at the lower pump, and endless rope are further used to give motion to the lower pumps. About 300 gallons of water per minute is raised by this engine day and night.

The system of working the Brockwell seam is by bord and pillar. The pillars are made 30 yards by 18 yards; bords, 4 to 5 yards wide. Both in the whole and pillar workings Davy lamps are used. Powder is prohibited in coal working; it is used only in blowing the fire-clay got in the bords, and in other stone work. Some of the coal tubs are made of wood, 8-in. wheels underneath, and carry 6½ cwt. of coal. Some have recently been made of steel-plates, and of the same size as the others outwardly, but carry 8 cwt. of coal. Fire-damp in moderate quantity is produced from this coal, requiring a copious supply of air for its dilution and removal. As previously explained, the agent for creating this supply is the Lemielle Ventilator. The drum is here 33 ft. in height, and is made to revolve in a circular chamber of masonry 24 ft. in diameter. The drum is turned by a 55-in. horizontal engine, 6-ft. stroke, direct-acting, fitted with two eccentrics and slide-valves; steam used expansively. The engine and drum go from 8 to 9 strokes per minute continually. The drum is 16 ft. in diameter, is supported from girders from the top, and partly by three wheels and a step at the bottom, and works eccentrically in the chamber.

By means of another shaft within the drum, which has a central position with respect to the chamber, and by means of eccentric rods connected to the three moveable wings, a certain volume of air is enclosed and thrown out from each wing at one revolution of the drum, by their action in each wing closing and opening during a revolution. It is important that the wings fit close to the chamber, otherwise a re-entry of air occurs, which will be greater as the drag in the mine increases. Experiments made on the Lemielle machine, working at different revolutions per minute, in January, 1869, gave the following results:—At 10 revolutions the average indicated pressure on the piston was 6½ lbs. per inch, equal 56-horse power; quantity of air exhausted from the mine, 60,757 cubic feet, with 2½ in. water-gauge, equal a force of 23.9 horse power, or 42½ per cent. of steam-power utilised. At 11½ revolutions the average indicated pressure was 12.3 lbs. on the piston, equal 127-horse power; quantity of air from the mine, 75,962 cubic feet, at 3.35 water-gauge, which gives a force of 40-horse power, or 31 per cent. utilised. At 14½ strokes the average indicated pressure on the piston was 16.5 lbs., equal 207-horse power; the quantity of air was 98,165 cubic feet, and 5.2 in. water-gauge, equal to a force of 80-horse power, or 38 per cent. utilised. At 16 revolutions per minute the average indicated pressure on the piston was 19.2 lbs., equal 266-horse power; the quantity of air exhausted was 97,338 cubic feet, at a water-gauge of 6.65 inches, equal to a force of 102-horse power, or 38 per cent. of the steam-power utilised.

The pressure of steam in the boilers at these experiments was from 34 to 36 lbs. per inch, and the steam was cut off at from 2½ to 4 feet of the stroke. At the present time the engine makes from 8 to 9 strokes per minute, and about 56,000 cubic feet of air is in circulation through the mine per minute. The cost of this engine and the ventilator together was 1300*l.* at the works of the Lillishall Company.

Another machine on the same principle, but only 24 ft. in height, was built by the same company for Washington Colliery. These are the only machines of this kind as yet adopted in this district; from their complexity of parts, and the duty obtained from them, they are not likely to come into greater use, especially when more effective machines are becoming known. The firm of Bell Brothers are also the owners of Tursdale Colliery, at which coal is raised to the extent of 500 tons per day, from a seam inferior, in point of coking quality, to that at Page Bank, but which is better adapted for steam purposes. The strata at Tursdale have been proved by sinking and boring to the depth of 78 fms. below the seam now worked. Only a seam of 20 in. in thickness was found in that distance, which there is a probability may be identical with the Brockwell seam at Page Bank. The Tursdale Mine is ventilated by a Biram fan, placed on an independent air-pit. Another winning to the Brockwell seam is in contemplation, to be made at Sunderland Bridge, contiguous to the extension of the Team Valley line; this will reduce the cost of leading coal intended for export, and afford better facilities for raising the water now pumped at Page Bank Pit.

EXPORTS OF RAILWAY IRON.—The weight of the railway iron exported from the United Kingdom in August was 88,632 tons, as compared with 100,466 tons in August, 1869, and 54,618 tons in August, 1868. The exports to the United States would seem to be still increasing, having been 41,076 tons in August, against 25,548 tons in August, 1869, and 23,250 tons in August, 1868. In the eight months ending Aug. 31, this year, the aggregate exports of railway iron made from the United Kingdom were 758,233 tons, against 620,188 tons in the corresponding period of 1869, and 388,676 tons in the corresponding period of 1868. Russia figured in these exports this year for 163,700 tons, against 159,049 and 47,637 tons respectively; and the United States for 279,616 tons this year, against 229,145 tons and 188,730 tons respectively. The exports have increased this year to Russia, Prussia, Holland, the Danubian Principalities, Cuba, Brazil, Chili, British America, and India; but they have decreased to Sweden, France, Spain, Egypt, Peru, and Australia. The value of the railway iron exported in August was 745,239*l.*, against 814,653*l.* in August, 1869, and 443,976*l.* in August, 1868; and in the eight months ending Aug. 31, this year, 6,180,382*l.*, against 4,941,151*l.* in the corresponding period of 1869, and 3,058,582*l.* in the corresponding period of 1868.

ASSESSMENT AND RATING.

SIR,—Referring to the principles of Rating that you wished to inculcate on overseers and assessment committees in your remarks on this important subject a few weeks since, I think the whole question is of so much importance that it may be well to enquire to what extent your views can be upheld.

Your statements were shortly these:—

- 1.—“That the law states most positively and clearly that our mines, our iron works, our copper smelting works, and our staple manufactures generally, shall be rated upon the ‘gross annual value’ of the property.”
- 2.—“That the best meaning of the intention of the Legislature is that conveyed by the interpretation clauses of the Valuation of Property (Metropolis) Act, 1869, which states—‘The term gross value means the annual rent which the tenant might reasonably be expected, taking one year with the other, to pay for the hereditaments, if the tenant undertook to pay all the usual tenants’ rates and taxes, and tithe commutation rent charges, if any; and if the landlord undertook to bear the cost of repairs and insurance, and other expenses, if any, necessary to maintain the hereditaments in a state to command such rent.’”
- 3.—“For rating purposes no difference is recognised between the large works and the private dwelling-houses.”
- 4.—“What the works will let for in the market is unquestionably the true test for rating purposes.”
- 5.—“That the cost of the works ‘form no criterion of valuation.’”
- 6.—“That the profits derivable therefrom ‘(from the works) form no criterion of valuation.’”
- 7.—“That the assessable rate should be governed solely by the ‘gross annual value,’ or ‘the annual rent which a tenant might reasonably be expected to pay, taking one year with another, he having also to pay all tenants’ rates and taxes.’”
- 8.—“This is not only the evident intention of the Legislature, but it is the common sense view of the case, and we trust it will be accepted and acted upon by assessment committees and parochial officials in the future.”

Now, Sir, in respect to the principle you advocate, I think it is clear that the “net annual value,” and not the “gross annual value,” is the sum at which the works should be rated. The 6th and 7th Will. IV., c. 96, enacts that—

“No rate for the relief of the poor in England and Wales shall be allowed by any justices, or be of any force, which shall not be made upon an estimate of the net annual value of the several hereditaments rated thereunto,” or “the rent at which the same might reasonably be expected to let from year to year, free of all usual tenants’ rates and taxes, and tithe commutation rent charges, if any, and deducting therefrom the probable average annual cost of the repairs, insurance and other expenses, if any, necessary to maintain them in a state to command such rent.”

And by the 25th and 26th Vict., c. 103, it is enacted that—
“The gross estimated rental, for the purpose of the schedule of this Act, shall be the rent at which the hereditaments might reasonably be expected to let from year to year, free of all usual tenants’ rates and taxes, and tithe commutation rent charge, if any, provided that nothing herein contained shall repeal or interfere with the provisions contained in the 1st sec. of the said Act (6th and 7th Will. IV., c. 96), defining the net annual value of the hereditaments to be rated.”
This agrees with the interpretation clauses of the Valuation of Property (Metropolis) Act, 1869, that you recite—i.e., the gross annual value, or rent, is the rent a tenant would give supposing he has to pay all “the usual tenants’ rates and taxes, and tithe commutation rent charges, if any,” in addition to such rent. And the net annual value, or rent, is the remainder of such rent after deducting “the probable average annual cost of the (landlord’s) repairs, insurance, and other expenses, if any, necessary to maintain the hereditaments in a state to command such rent.” The latter, or the “net annual value,” and not the former, or “gross annual value,” is the ratable value, and upon which the works are to be rated.

2.—It should not be forgotten that the Act you here recite does not apply outside the metropolis, and valuers and overseers must still be guided by those Acts only which apply to the country.

3.—The statute law recognises no difference in principle in rating large works and private dwelling-houses—that is to say, they are both to be rated at the “net annual value” or rent (6 and 7 Will. 4, c. 96). Although in this sense there is no difference in principle, yet in the practical application of the principle to all hereditaments alike great difficulty and differences must of necessity arise. There is little or no difficulty in estimating the rent at which land, dwelling-houses, shops, warehouses, and such hereditaments might reasonably be expected to let at from year to year, as they are commonly let from year to year at bona fide yearly rents. But there are other hereditaments, such as railways, water works, gas works, canals, docks, and other public works; collieries, iron works, copper works, and other large staple works and manufactures carried on as private enterprises; and also mansion-houses, which are rarely, if ever, let from year to year at bona fide yearly rentals. Amongst these are also hereditaments producing no direct profits, and where, “in practice, a tenant from year to year is hardly, if ever, known.” In all these cases the application of the principle is complex, and considerable difficulty at times arises in estimating “the net annual value,” for property of this description “is not strictly capable of being valued by reference to its lettable value;” “hence in practice it becomes necessary to seek some other mode of arriving at the correct estimate of the ‘net annual value.’”

4.—In some cases “what the works will let for in the market” may be “the true test for rating purposes;” but in other cases there are properties to be rated that are not, and cannot be, let in the market at a rent “from year to year,” as contemplated by the Act. The Court of Queen’s Bench has decided in such cases that—

“The ratable value of the premises where an ordinary tenant is not known is to be determined according to the Parochial Assessment Act, according to the rent that a hypothetical tenant, making suitable deductions, would give for the ratable property.” (R. v. Inhabitants of Lee, 13 L. T. R., N. S., 704.)

5.—“The cost of the works form no criterion” (per se) “of valuation,” but in many cases the cost, with proper deductions, forms an important element of calculation, and frequently the present value of the fixed capital, vested in the ratable property, presents the safest basis for estimating the rent to a hypothetical tenant. In R. v. Overseers of Hampton, 28 L.J., M.C. 135, it was held—

“The hypothetical tenant must be assumed to pay adequate remuneration for the land and the fixed capital invested therein, and the local ratable value would be such a sum as would pay the rent of the land, and profit on the fixed capital therein.”

6.—In all cases where the ratable property produces direct profits no better criterion of valuation can be taken for rating purposes. In the case of R. v. Lower Mitton, 9 B. and C., 810, it was held—
“That the rate must be laid according to the annual profit or value which the subject of occupation within the parish produces;” and in R. v. Dorking, 18 Jur. 673, it was held—“The profit during the year in which the rate is made is the material fact for the guidance of the parish officers in making the rate.” The Superior Courts have laid down this principle of valuing public works for assessment in numerous cases. In R. v. London and South-Western Railway Company, 11 L.J. (N.S.), M.C. 93, it was held that the ratable value should depend upon the gross receipts (with proper deductions). In R. v. Grand Junction Railway Company, 13 L.J. (N.S.), M.C. 94, it

was held the gross receipts should be made the basis of the estimate of the ratable value; and in *R. v. Great Western Railway Company* (second Lilliehurst case, 1852), Lord Campbell, J.C., in his clear and able exposition of what the principle of valuation ought to be, says "The net ratable value is that which remains of the gross receipts after all just deductions made." In the Railway Clauses Consolidation Act, 1845, a clause is inserted by which it is enacted "That the company shall every year cause an annual account in abstract to be prepared, showing the total receipts and expenditure for the year, 'duly audited and certified; and shall, if required, transmit a copy of the said account, free of charge, to the overseers of the poor of the several parishes through which the railway shall pass.'"

The assessment also of water works, gas works, docks, &c., are all made upon the "annual value," or "profits," allowing suitable deductions therefrom for interest on tenants' capital, tenants' profits, depreciation and renewal, rates and taxes, and landlords' repairs and maintenance, and other expenses, if any. The adoption of this principle for the assessment of collieries, iron, copper, tin-plate, chemical, and all our large staple works and manufactories, that "in practice, are rarely, if ever," let to a tenant "from year to year," would unquestionably be the most just and equitable, for the rent that a tenant could afford to give would be in direct proportion to the net "profits he could make out of the concern." But at the same time I am aware that great difficulty must always arise in ascertaining the net annual profit of those concerns that are not of a public character, and do not publish an annual balance-sheet, which could only be removed by the occupiers of such works rendering an annual account to the overseers when called upon; it is, however, more than doubtful whether private firms would not consider it most objectionable to have their private books and accounts made the subject of inspection, and would probably in attempting to carry this principle into practice think it as inquisitorial and unpleasant as the income tax. And, again, although a competent valuer might perhaps often be able to form an estimate of the yearly profits from which to calculate the "net annual value" without the production of accounts, yet in many instances it is quite impossible for him to do so; and even where he does attempt it the valuation could be at once upset, if found to be based upon figures which any subsequent examination of the books showed to be incorrect. In those cases, therefore, where this objection would be strongly felt, and in all those cases where no direct profit is made, it would be desirable, and even necessary, to adopt the principle of a "hypothetical tenant, assumed to pay adequate remuneration for the land, and fixed capital therein," before alluded to; and this, whilst providing a just and reasonable valuation, would be strictly legal.

7.—Your term "assessable rate" I do not understand; "assessable value," "ratable value," "ratable assessment," and "net annual value" are synonymous; and if you use "assessable rate" in the same signification, then it should be governed by the "gross annual value" only in the sense that it is derived therefrom by deducting "the probable average annual cost of the repairs, insurance, and other expenses, if any, necessary to maintain the hereditaments in a state to command such rent," or gross annual value.

8.—Your remarks here are evidently intended to apply equally to your last three statements, and I think I have shown that they are not altogether in accordance with the statutes, or the decision of the Court of Queen's Bench, which, it will be granted, carries with it "the common sense view of the case." I think, therefore, assessment committees, parochial officers, and valuers show a just appreciation of their duties when they endeavour to carry out the letter and spirit of the Legislature by exercising an unbiased judgment to bring each particular case within the decisions of the superior courts, and thus ascertain the "net annual value" from correct data, and upon sound principle, rather than trusting to valuations, by which the annual rent is often estimated by mere "guess-work," or to valuers who profess to be able to arrive at the annual lettable value of "our mines, iron works, copper smelting works, and our staple manufactures generally, by mere superficial inspection, and without any calculation or knowledge as to the value of the works, their productive capacity, or their annual profit."

Comparing your comments on "rating of collieries," in last week's Journal, where you say "no satisfactory basis has yet been settled upon which collieries may be valued and assessed for the payment of rates," with your declarations above, "that the law states most positively and clearly that our mines, &c., shall be rated upon the gross annual value of the property," I am somewhat surprised at the apparent inconsistency of reasoning, and of the deductions you have drawn therefrom, which I take, in short, to be that the present law and practice of assessing collieries is inapplicable, and that to remedy this it would be desirable to have "some universal basis of valuation," and would "be advisable to consult the opinions of the colliery proprietors themselves upon the matter, as they are most deeply interested, and their views should be allowed to have some weight; and that at a general meeting of the overseers and colliery proprietors of the county resolutions could be amicably arrived at to set at rest a question of much perplexity and doubt."

Passing by the statement that "the collieries in the South Wales district have hitherto been assessed upon a uniform rate of 6d. per ton upon the quantity of coal raised," as being quite inconsistent with the facts (unless exceptions be taken as the rule), I would ask whether it does not occur to you that the same principles of law and practice which hold good in respect to every other description of ratable property should, without fear or favour, be also applied to "our mines" or collieries—i.e., that they should "be assessed upon their 'net annual value,' or their rent at which the same might reasonably be expected to let from year to year," after deducting all statutory deductions.

I am afraid the idea of arriving at "some universal basis" of valuation for our collieries, other than in general principles, would not only be chimerical, but opposed to this one leading principle of all just valuations for rating purposes.

In the case of *R. v. Attwood, 6 B. and C., 277, Abbott, C. J., said*—"We are all of opinion that the owner and occupier of a coal mine should be rated at such a sum as it would let for, and no more." "The Legislature has expressly made coal mines rateable, and they must be rated for what they produce—the coal." "If the tenant of a mine expends money in making it more productive, that is the same as expending money in improving a farm or house, in which cases the tenant is rateable for the improved value."

In the case of *R. v. Lord Granville, 9 B. and C., 189*, the question for the Court was, whether the appellants ought to be rated for the engines and railway, in addition to what he ought to pay as a mine rent? Littlejohn, J., said—"The question is, whether the defendant is liable to be rated at the increased rent mentioned in the case, by reason of the engine and railway he has erected. It is immaterial with reference to rateability, whether the landlord or the tenant erect an engine or lay down a railway. The bargain between the landlord and tenant may be varied on that account, but the occupier of the property is rateable in respect to its improved value."

Bayley, J., said—"I have no doubt the defendant ought to be rated for his engines and railway . . . and where the owner of a mine fits an engine, or otherwise by expenditure of his capital raises the value of his property, he will be rateable for the value of that property so improved by his expenditure. If it is leased to a tenant who is to incur the same expenditure . . . I think the tenant, being the occupier, is liable to be rated for such improved value."

Park, J., said—"The only question for us, however, is, 'whether it be right in principle to rate the lessee in respect to an annual value, increased by reason of improvements made by himself.' I think he was properly rated for the improved value." It appears to me that here we have the principles of colliery valuation for rating purposes fully and clearly laid down, and although overseers and valuers may differ in their *modus operandi*, yet any valuation, to stand the test of the superior courts, must rest on this as the only "universal basis of valuation."

Now, although some small collieries may occasionally be let from year to year, with all the fixed plant and appliances at a *bona fide* yearly rental, yet I think it will be conceded that large and profitable current going collieries "are rarely if ever," let from year to year at *bona fide* yearly rentals. The ratable value of these premises, "therefore, where an ordinary tenant is not known is to be determined according to the Parochial Assessment Act, according to the rent that a hypothetical tenant, making suitable deductions, would give for the ratable property."

In accordance with the decisions, before quoted, the hypothetical tenant must be assumed to pay—

1.—An adequate mine rent or royalty.

2.—An adequate surface rent for the land, occupied by the colliery premises, and surface works.

3.—Such a profit, or rent, to the capitalist, or first lessee, for remuneration in sinking pits and winning the coal, and for interest on the present value of his capital vested in the buildings, fixed machinery, plant, and appliances as the mine can afford to pay, after allowing the tenant his trade profits, and making due provision for the renewal of the horses and trams, tools, and other such like movable tenants' plant, and for maintenance of works. I consider this to be the "reasonable rent," "according to the Parochial Assessment Act," and that which a competent mining engineer would not have any great difficulty in estimating with a tolerable degree of accuracy; and, in doing so, I would only premise that he should make his calculations precisely in the same manner as if he were himself about to become the tenant, from year to year, in place of the hypothetical tenant.

In valuing collieries for rating purposes it is necessary to take the whole circumstances of each colliery separately into careful consideration before estimating its present lettable value from year to year. The customary average royalties payable by the surrounding collieries, the quality and conditions for working under which the coal is found, the quantity of water, depth from surface, inclination of the strata, freedom or otherwise from faults, working cost, distance from market, and facilities for transit and sale of the coal, the present value of the capital vested in sinking pits and winning the coal, and in the erection of buildings, railways, fixed machinery, and appliances, and also the area and probable duration of the coal to be worked, all tend greatly to influence the rent a tenant would give for a colliery at the time of making the assessment.

It is, therefore, manifestly hopeless and impracticable to attempt any "universal basis of valuation," other than in general principles, which are already clearly laid down. Overseers and valuers are bound to make their valuation in accordance with the statute and expounded law, and no "general meeting of overseers and colliery proprietors" could arrive at any resolutions "to set at rest a question of perplexity and doubt," where that perplexity and doubt (if any) can only arise in ascertaining the necessary but variable data or figures for estimating the annual rental value of each colliery separately. At the same time, I think a friendly conference between the colliery owner or occupier and the valuer always highly desirable, as tending to an amicable elucidation of those facts or data upon which it is necessary to base the valuation of each colliery respectively, and generally to inspire a spirit of fairness and reasonable adjustment in arriving at the "truths admitted."

Your correspondent, "Reader," will see from these remarks that I quite agree with the general principles of colliery rating that he advocates. He unquestionably maintains the letter and spirit of the Legislature, and any opposition that would endeavour to substantiate any other principle of rating, by excluding a portion of the rent from year to year, fairly chargeable upon any property, would certainly fail in sustaining the same before the Court of Queen's Bench; and besides, the overseers would not be justly exercising the duties incumbent upon them under 25 and 26 Vict., c. 103, sec. 14 (which enacts that, "Unless such overseers think that the valuation then last acted upon, in assessing the rate for the relief of the poor, correctly shows the full amount of the ratable value of all such hereditaments; they shall revise such valuations"), if they were parties to any such deduction. —*Swansea, Oct. 8.* M.E. AND C.E.

COMMISSION OF ENQUIRY ON TRUCK.

SIR,—I looked in on two or three occasions at Cardiff, and heard some portion of the evidence. As a staunch opponent to "Truck" for many years past, I looked forward with considerable confidence for a thorough investigation that would be the basis for practical and effective legislation in 1871, so as to utterly annihilate "Truck;" but, Mr. Editor, I am grievously disappointed. There was an utter absence of anything and everything in shape of dignity about the Court, and also the manner in which the learned Commissioners put their questions, and in the treatment of the several witnesses. It struck me that there was a marked absence of gentlemen from both Glamorganshire and Monmouthshire, and gentlemen of very considerable experience and independence of character, and who could have been compelled to attend, and could have placed matters in a far clearer light before the Commission, and would have been competent to suggest what the contemplated legislation should be.

I can only hope that the Commissioners will again visit Cardiff, and receive the evidence of some half-dozen more. Whilst in the room enquiries were made, such as—"Where is A? surely he ought to be here." "I wonder B has not shown up, a man who knows so much." The like as to C, and so on. No Truck.

Morganwg, Oct. 8.

BOILER EXPLOSIONS.

SIR,—The inquest upon the bodies of those killed by the effects of a boiler explosion at the Chatterley Works, Tunstall, on Sept. 17, terminated on Friday, Oct. 7, the jury returning a verdict of "Accidental Death." To this verdict they coupled a recommendation that the precautions mentioned by Mr. Longridge for the safety of the other boilers should be carried out, and that particular attention should be paid by the authorities at the works to the way in which the men attended to their work, and that greater care be taken by the men at the change of turn. The Mr. Longridge mentioned above is chief engineer of the Manchester Boiler Insurance and Steam-Power Company, and is an authority of vast experience upon the subject of boiler explosions. This gentleman was engaged by the Coroner to report upon the cause of the Chatterley explosion; and, as his report is interspersed with sound advice, and suggests precautions which are applicable not only to the present case, but to hundreds where the circumstances are the same, I append the greater portion of it. After giving a full description of the construction of the boiler, he said:—

"I am satisfied that the explosion is not the result of excessive pressure, nor has it resulted from deficiency of water. At the fifth circular seam from the front end, where rupture has taken place, the boiler has undergone repairs, as shown by a patch about 3½ feet long, averaging 12 in. in width. From the appearance of the plate to which this patch has been riveted, it is evident that an extensive fracture had existed previous to the explosion, the leakage from which has caused corrosion of the plates and rivet heads. In addition to this patch there is a similar patch on the left hand side between the third and fourth rings of the shell. Several of the plates over the fire have also been renewed from time to time on account of fractures. On examining three other boilers of the same construction, which had worked in connection with that which exploded, I found that these had undergone similar repairs, from which it is evident that all of them have suffered from the same evils. These evils are:—1st. Overheating of the plates, owing to accumulation of deposits, consisting of carbonate and sulphate of lime, which is present in large quantities. 2nd. Sudden contraction of the over-heated plates, owing to the feed water being delivered cold directly upon the bottom of the boiler. 3rd. Overstraining of the boiler, owing to the objectionable practice of blowing off the water under pressure, preparatory to cleaning before the surrounding brickwork has had time to cool. Under such circumstances the underside of a boiler expands and becomes elongated by overheating, and on cooling is subjected to an excessive strain from contraction, which process, frequently repeated, ultimately results in fracture, and if the fracture be not detected in time explosion is the inevitable consequence. These three evils combined have caused the frequent fractures above referred to, and the extensive fracture at the fifth circular seam has been the immediate cause of the present explosion. Unless efficient means be adopted to remedy these evils it is not improbable that a similar explosion may occur to one or more of the other boilers. The remedies are simple.—1st. If better water cannot be obtained, collecting vessels or a scumming apparatus should be introduced into each boiler to prevent accumulation of deposit on the plates exposed to the fire, and the boilers should be cleaned more frequently. 2nd. The feed pipe should be shortened, and an elbow attached, in order that the feed water may be delivered horizontally about 2 feet above the bottom of the boiler. 3rd. When a boiler is stopped for cleaning, the water should not be run off until the brickwork has had sufficient time to cool, that there may be no overheating of the plates, nor overstraining from contraction in cooling. If these suggestions be adopted there will be much less expense in repairs, and no danger of explosion from the causes mentioned."

After perusing this report there will be no doubt left in the mind as to the cause of the explosion, for it is clearly set forth; and were boilers more generally brought under the supervision of such men as Mr. Longridge these disastrous explosions would be far less frequent. Some people are apt to attribute boiler explosions to mysterious causes. This idea was all very well in times gone by, when people were little acquainted with the working of steam-boilers, and in many cases, we are aware, led the minds of juries away from the actual causes, which were brought about by the negligence of persons whom the scientific witness endeavoured to shield. Now-a-days the mind of the public is better tutored in these matters, and not so easily deceived. We are quite conversant with the fact that many people, and engineers, too, do yet sincerely hold the opinion that some boilers explode from mysterious causes, and some really clever theories have been worked

out; but in many instances a very little practice is worth a large amount of theory, and we are quite sure that men who combine practice with theory, such as the engineers of the boiler insurance companies, or, in fact, any great authorities, would none of them, if they were questioned upon the matter, give any answer that would lead to the supposition that they entertained an idea of mysterious causes connected with boiler explosions.

At the Chatterley Works, as has been the case at most of the works where explosions have within this last year or two occurred, a boiler maker or repairer has been entrusted with the inspection of the boilers. This is a system that is carried out to a great extent in the Midland Counties, and one which cannot be too severely condemned, for these boiler makers are, as a rule, unqualified to understand the state of a boiler. Their knowledge extends this far—if a boiler leaks they know it wants a patch, or if a plate is much worn, and they discover it, they know it wants renewing, and so they go to work, the very repairs they make often causing an explosion. It often occurs that patch upon patch is put upon boilers, and as long as the leakage has been stopped they have been considered safe, but instead of this being the case the repairing has really weakened them until they have become untrustworthy. We do not include in our stigma first-class firms, as we know there are some whose proprietors, or managers, are excellent authorities upon the subject of steam-boilers; but these are not the persons, it will be found, to whom many of the ironmasters and colliery proprietors entrust the inspection and repairs of their boilers. The men we speak of are sometimes blacksmiths, but generally journeymen boiler makers, who set up on their own account. Some of them have no premises; they merely go about doing repairs, their stock in trade consisting of a portable forge and bellows, a few cupping tools, hammers, and drifts; others have a small yard, which by dint of industry they have managed to stock and rent.

Now, we ask, can it be expected that such men are able to judge of the condition or safety of steam-boilers, under whatever circumstances, or peculiar actions to which they may be subjected? No one with common sense would for one moment suppose they could, and yet proprietors leave the charge of their boilers in their hands, and should any serious consequences result they console themselves with the idea that no blame can be attached to them, as they have taken necessary precautions. There is no doubt, but the boiler at the Chatterley Works, or, in fact, most of those which have lately exploded, been properly inspected by scientific men, these serious explosions would not have occurred. We do not, as we have often stated, advocate Government inspection, and yet it must come if owners themselves do not take steps to prevent these now frequent disasters, by either placing their boilers under the surveillance of one of the insurance companies, or by appointing properly qualified private inspectors. In the latter case it will be no use employing men without their orders are thoroughly carried out, for when there is no fine or penalty they are apt to be disregarded, a case having come under our own notice where a private inspector threw up his appointment in disgust, not being willing to take the responsibility where his instructions were not attended to. —*MENTOR.*

THE GREAT WESTERN MARITIME SHIP CANAL.

SIR,—The suggestion of your correspondent, "G. B." ("A Tivertonian") to pass the canal through a tunnel under Exeter Hill betrays an ignorance of the main features of the scheme which is hardly excusable, considering the able and lucid manner in which it has been commented upon by the *Mining Journal* and the other leading journals of the day.

The canal is designed to connect directly the English and Bristol Channels by a passage 124 ft. wide, and 21 ft. deep, capacious enough to admit of the transit of screw colliers of the greatest burden, the Liverpool and Irish steamers, the ships engaged in the timber and corn trades, &c., all masted vessels of the largest tonnage. The railways and roads will be carried across the canal by swing-bridges, and it is, of course, idle to talk of tunnels in an undertaking of this magnitude, and with these objects, which will be as much an ocean highway as the great work of M. de Lesseps, and the Regent's Canal barge cut, instanced by your correspondent, bears no analogy to it whatever. The canals already existing in the locality will be utilised so far as they can be made available; and if "Tivertonian" will take the trouble to examine the country proposed to be traversed he will see that it is quite feasible to get round Exeter, and reach the sea at Langstone Point (not Exmouth), without attempting any impossible tunnels. —*F. A. OWEN.*

City Carlton Club, London, Oct. 8.

COPPER ORE SALE FROM THE MERRYBENT MINES.

SIR,—I beg to call the attention of your readers to the following details of a sale of copper ore made last week at Swansea. The ore is the produce of the Merrybent Mines, near Darlington, and has been obtained in the Mountain Limestone, from a short length of the adit level, not above 8 to 10 fms. below the surface. I believe the quality of the ore to be almost unprecedented in richness as the produce of an English mine. I may add that a course of ore equally rich holds down below the adit, and that the mine promises to produce considerable quantities at a very light cost, as the lumps of copper ore are found embedded in soft red clay, very easily worked, which on being washed off leaves the ore in the state in which it was sampled at Swansea. The ore was purchased by Messrs. Sims, Williams, and Co., and Messrs. Vivian and Sons, at the prices stated.

Darlington, Oct. 4.

Estimated quantity.	Estimated percentage of copper.	Selling price per ton.
13 tons.	41½ per cent.	£26 13 6
40 tons.	40 per cent.	25 7 6
14 tons.	25 per cent.	17 1 0
5 tons.	17½ per cent.	10 14 6
5 tons.	15 per cent.	8 13 6

MINING IN CARDIGANSHIRE.

SIR,—I have this week, according to promise, gone over some of the mines in the upper part of this great mining county; and although in one or two instances, where the water is in the mines, short of surface-water, to drive the machinery, yet I am glad to say that this part of the county never looked better and more promising as to underground appearances.

PLYNNIMON MINE being the first on the list of Cardiganshire mines eastward, here, then, let me begin. The mine is partly idle for the want of water and extra machinery. This I expect will shortly be entirely altered, as they are now erecting a new water-wheel, &c., all complete, for the use of keeping the water under ground. The present wheel, which had this the work to do, as well as to work the crusher, will henceforth be employed for the crusher only, when, doubtless, from the great reserves underground in both bottom and backs, as well as other bargains in the mine, we may expect large and rich quantities of lead going into the market, which speaks best for the future worth and welfare of the mine. All the land both east and west of property has been taken up by mining gentlemen, who we trust, and have no reason to fear, may ere long be enabled to sail in the same fortunate boat as their rich central neighbour. I met a certain gentleman on my return from this mine, who was so much pleased with the district that he spoke of going largely into an adjoining mine with the already formed party, if shares could at all be had.

ESGAR LLE, next in rotation, came shortly in view. I will first dwell on the old part of this mine, which was formerly worked by Mr. T. P. Thomas, now of the Bwlch Gwyn Mines, where a great deal of money was made, and in time abandoned—too much like many others of the most profitable mines in the county. Here there are three adit levels driven in the side of the hill to the lode, and in the central one the men are engaged clearing and fixing rails in lode, for the purpose of working this part of the mine further down the hill, formerly the property of a gentleman in Birmingham, but now in the hands of a London company, under the able management of Messrs. John Taylor and Sons, still bearing the well-known name, Esgar Lle. This mine, by means of shafts being driven east into the old mine, will ere long doubtless become as rich and profitable as it ever was in the days of the former company. The deepest part of this united mine west of engine-shaft (I mean the lowest level) is down 22 fms. below the adit, now about 10 fms. further west than any part of the mine—at present worth fully 2 tons of rich lead ore to the fathom. The engine-shaft has been sunk 12 fms. below this level. They have also commenced driving out to the lode, and should the lode prove at this depth equal to the levels above (and we have every reason to believe it will surpass it) then it will speak for itself in the monthly markets, and we hope handsomely repay the present (and we have every reason to believe it will) in bringing to life again that spirited shareholders for their untiring energy in bringing to life again that which at one time was given up as finished for ever. The second parcel of ore was being carried away while I was there.

We next come to a mine further west, called the WEST ESGAR LLE. Having but little to speak of for the present, I would rather wait for a short time until they shall have intersected the lead lode in their present cross-cut, which from present appearances cannot be far now before them. Should the prospects when met with be as healthy and as cheerful as in the adit near surface, we may say with propriety that it will repay them for the past and present outlay. The men that are engaged in another part of the mine are breaking and sending

away to surface large quantities of good blende, and I believe they are now about preparing to bring a parcel to market, of some 40 or 50 tons.
Pen-y-Groes, Wales, Oct. 13. SAMPHON TREYTHAN, M.E.

MINING AS AN INVESTMENT.

SIR.—Those who admire mining as a pursuit, and profit by it as an investment, must observe with satisfaction that its exceptional and material advantages are daily becoming better understood and appreciated by the general public; but its advocates, or, at least, those who rush into it on occasions of the Devon Great Consols, by thrusting in dividends nearly 1200% upon each 11. share, and having returned in many cases to the only instance in which large and, no doubt, does seem, to be still being realised upon the investment of a small amount of capital; a reference to your Share-List shows that there are many equally noteworthy instances. For example, Levant has paid no less than 1010% on the rate of 9½ per cent. upon the present price of the stock, and is now paying at the rate of 647% upon each 11. 5s. share, and is yielding 13½ per cent.; South Caradon has returned 647% upon each 11. 5s. share, and is yielding 13½ per cent.; West Seton, 643% upon each 47. share, and yielding 16½ per cent.; South Frances, 375% upon each 19. share; Wheal Bassett, 632% upon each 11. share; South Ovelles, 464% upon each 70. share; Phoenix, 456% upon each 11. share; and yielding 14 per cent.; Providence, 106% on each 10. share, and yielding 15 per cent. I find, too, that East Lovell is at the present time paying 15 per cent. at the rate of 25 per cent. upon the market price of the shares, the dividends being 21 per cent. quarterly. East Lovell is paying by far a larger percentage upon the shares than any mine in the List, and the reason appears to be that the certain clique of speculators are continually using every means to their power, and oftentimes most unjust means, to induce bona fide holders to part with their interest, the object, of course, being to secure the holders to meet previous sales effected at higher prices—hence the wisdom and foresight of the manager's admission, which appeared in last week's Journal, that the shares are not to be mislead by anonymous letters. In addition, I advise shareholders not to be misled by the fact that the price of the shares is at the present time 15½ per cent. above the market price; the Wheal Margaret is paying 14 per cent.; Wheal Mary Ann, 21 per cent.; Tincroft, 17 per cent.; and many others to which I need not refer.

Among Welsh mines I find the Cwmystwith has returned 387% upon each 60. share; East Darren, 182% upon each 32. share; Minera, 278% upon each 25. share; and Ll-burne, 520% upon each 18. 15s. share, &c.

I would not have trespassed thus far upon your space had I not deemed it necessary to dispel what I believe to be a growing opinion that the prices in mines are much less frequent than your own Share-List attest. Accept my apology for thus intruding this communication upon your space, and allow me to subscribe myself—
A LOVER OF MINING.

MINING IN FLINTSHIRE—THE RHESOMOR MINE.

SIR.—A short time ago I sent you a brief account of the starting of the engines at the Rhesomor Mine. Feeling interested in the welfare of the district, which for two years so greatly suffered from the suspension of this magnificent mine, and several others in the neighbourhood, I have watched carefully the result of operations, and have, therefore, made it a point not only to visit the mine often, but to make the enquiries necessary to give in this letter a truthful statement of the great success which has been fully accomplished by the energy of the proprietors. Having drained the deepest level (140 yards) in about nine days, the clearing of the mine commenced in good earnest, and also the sinking of the main shaft (Batters') below that level. They have already succeeded in sinking the shaft 3 yards, making the present depth about 15 yards below the 140 yard level. The lode now in the shaft is about 3 ft. wide, well defined, and from the stuff I saw drawing from it to-day, it must be very productive for lead. The small is excellent work, and the lode is very rich in lead. This new ore is of a fine quality, which are not a few, speaks volumes for the future of the mine, as there is not the least doubt they are now entering on a large deposit of ore. The water has also been drained off from several good bunches of ore below the 140 yard level by manual labour, in order to prove their value, and I am happy to say that all of them confirm the former report as to their value. I was delighted to see the splendid heaps of ore on the surface from these places, and I am sure that the lode is a fine one. I saw a stone of solid ore brought from the shaft, and I heard that the lode has been so satisfied with the richness of these several deposits of ore that they have decided on extraordinary remain until they become unwatered by the sinking of Batters' shaft, which, in all probability, will be done in a very short time, when the ore can be taken away for about 11. per ton.

Another important acquisition to the value of the mine is the discovery of a parallel lode about 100 yards north from the main lode, and altogether unexpected, except by a winze below the 100 yard level, where a rich lode of solid ore has been found, about 6 ft. wide. I saw a stone of solid ore brought from there to-day, about 6 ft. wide. I heartily congratulate the proprietors; and, for the first time, I feel that they have manifested in re-opening the mine, their richly deserved great and rich property they have found, and the reward they will ultimately receive.—Halkin, Oct. 11. WELL-WISHER.

THE MINES OF CARDIGANSHIRE.

SIR.—Having received circulars and reports on the Nanteos Consols Mines, I am glad to express an opinion that the prospect of them, not only out of the hands of the shareholders, but at all enlightened on the prospects of the property by their personal. Allow me, therefore, to lay a few simple facts through the medium of your widely-spread Journal before them. What has been done has been done at Penrhyn, being the western portion of the property, and the present part of it. However, machinery and dressing apparatus have been erected, and are now almost ready at Bwlch Gwyn, being the richest part of the mines, and I would undertake for the sum of 3000. to place this property in a state of lasting profit. What must have been their business, Mr. Editor. What would you think of hearing that I had undertaken the management of a farm in some of the Midland Counties of some 1000 acres? Why you would naturally conclude that I was mad. Then, may I ask you what is the difference between a miner becoming a farmer than a farmer or any other tradesman stepping in as the manager of a cluster of mines?

Regular Her and Esair-Fraith, two of the great and rich mines of the county, now being worked with energy and spirit, and although operations for draining the mines were only commenced nine or ten days ago, very rich bunches of ore have been found starting, and they will immediately assume a profitable state, and I have no doubt ultimately, and at no distant date, become what they now were—the greatest of the great mines in this county. I have myself seen a Regular Her courses of lead ore 6 ft. wide, what is generally termed solid. The only working on this great vein between the mines and Tal-y-bont, a distance of seven miles, is a little that has been worked at Blaen Caelan, which adjoins the Esair-Fraith boundary to the west. From this 5 miles westward there is, no doubt, hidden treasures to be explored to the extent of many millions, and which it is to be hoped will be speedily uncovered, but the greatest portion must remain for generations to come.
Gwyn, Aberystwyth, Oct. 6. ABASLOM FRANCIS.

PROMISES IN MINE REPORTS.

SIR.—Your correspondent, "Observer," who, writing from a pleasant watering place in Lancashire, contains that the dressing floors at Pen Allt Mine were completed and in working order at the time he was led to expect, does the directors of the company some injustice. They have not spared any effort to hasten the completion of contracts so that working operations could be commenced; but unforeseen delays intervened, for which the Welsh director is more responsible than the board. However, if "Observer" will now take a trip from Liverpool to Pen Allt, he may see with his own eyes the dressing machinery in operation, and Capt. Glanville will, doubtless, show him No. 6 cross-cut, where the lode running eastward has been again cut, producing good silver-lead ore.
Lancaster, Oct. 13. A DIRECTOR.

BODMIN TIN DISTRICT.

SIR.—Having read the letter of "An Old Adventurer," in last week's Journal, I am glad to see that he appears to know nothing of the private companies in the district, and that he puts it down for granted that it is a bad district. Now, for the information of "An Old Adventurer," I beg to say MULBERRY is worked in this district as a private adventure; nothing is said about it in the papers, and yet, with a capital of about 10000. it is yielding from 2000. to 3000. profit per month, and it is said will double this amount in a short time. Then, there is the Woodstock and the ROSEWARK, private also; and WEST DOWNS and WEST WHEAL PROSPER MINES, which have made large profits; and all these are private concerns. Some of these mines are worked, and have been for some time, by miners on tribute, at about 10s. or 12s. in 100, and I know they are making good wages. There are other works in the district in the hands of private companies. "An Old Adventurer" knows nothing of this, unless he lives in the district. He says he is told there is tin in the district, but in large lodes, and that there must be a high price for tin for mines to pay. Now, let me tell you, "An Old Adventurer," the yield of tin in most of these large lodes, or open cuttings, is about 4 lbs. of tin to the ton of lode stuff, and the cost of removing and putting this into the stamps is from 3d. to 4d. per ton. This yield is at 4 fms. from surface, but at 10 fms. the yield is 10 or 12 lbs., and this is as deep as the tin is worked; but I have seen it at 22 fms. from surface, and then it was worth 25 lbs. to the ton. The yield increases with depth. I do not know what "An Old Adventurer" thinks of this, but I am of opinion that the very best of the richest tin districts in Cornwall. My reasons are these. Where can you find so much tin raised at so shallow a depth as in this district? And what mines opening now have most promising prospects at shallow depths. But let us sink the different mines as in other places, where prospects are nothing to be got? Where can "An Old Adventurer" find a single mine in this district that has been sunk to 70, or even 60, fms. that has not returned large profits? Being myself a mine agent, and having inspected and also worked in many of the mines of Cornwall and Devon, and from my experience I believe this district to be the ground is cheap to sink.

I will name the two most promising of the mines now opening up. First, near TRETOIL and TREBELL. Here, I believe, with a small 7 in. shaft, they sunk 15 fms., and from a depth shallow as that, with only four of the shaft, they raised and stamped 2 tons of tin in three weeks. And if I am not mistaken, the agent from Great Wheal Vor valued the lode in the report at 100 fms., and the lode then a 30-in. engine has been erected, and the shaft sunk 100 fms. from surface, and it is said to be worth very much more now. Surely this was worth a trial. I beg to say that I have not a single share in the mine, but I am employed there. I beg to say that I will undoubtedly be a splendid success, and I am sure that the lode is 20 ft. wide, and the large rocks are abundant on the surface speak for the mine; the lode is reported to be very rich, and his report is most favourable. Then, I would say let these and other mines be sunk, and let the management. I can point out capital mines in the management hundreds of miles from the mine, by directors knowing nothing

of what they are about; and other mines will follow yet. Again, agents are placed in mines, having been sent by interested parties, who never saw a mine before. I think "Old Adventurer" may put a good score in his pocket here. I will, if you will kindly allow me, point out other mines in this district that will make their mark at a future time.
MINE AGENT.

RELATIVE MARKET VALUE OF PROGRESSIVE MINES.

SIR.—From the tenor of his letter, which appeared in the Journal of Oct. 1, I should imagine "A Country Investor" to be a London promoter. I hope he will pardon me for condemning his inferences as being decidedly illogical. He accuses me of desiring to extol one mine, at the "expense or disparagement of another," but had I without good cause have attempted such an unfair proceeding, I am well aware my letter would never have appeared in your columns. Your correspondent appears to deprecate the re-opening of this question, the discussion of which may, perhaps, militate against his personal interests; but when there are such frequent instances of enormous losses being incurred through injudicious purchases, I think that the investing public will welcome any correspondence which may throw any light upon a subject of such vital importance. I selected twelve mines from the back page of the Mining Journal, and showed that some were selling at twenty times the price of others, without there being, in my opinion, the slightest reason why any material disparity should exist. "A Country Investor" asserts that "the instances which I have quoted are altogether apart from the subject, simply because at least four out of the mines named do not possess any market existence." As to regard this as post prandial logic? He states that "I have signally failed to throw any light upon the subject." But did I attempt to do so? Did I not leave that task to some other correspondent? But it does not, therefore, follow that when I have more leisure I am not capable of doing so. "A Country Investor" designates one instance as unfortunate, because I compared a mine "which certainly is not known upon the market" with another "the shares in which can be readily dealt in at ¼ difference." Am I to infer from this that he considers it to be a desirable feature for the shares in a mine to be not readily negotiable? I presume he alludes to my remarks respecting Terras (dn) and New Lovell. If the former be not readily marketable it is not from want of puffing, for there are few newspapers in which its merits are not strenuously extolled; but I may be allowed to prefer New Lovell, which is selling for less than one-fourth of the price, and the shares in which can be dealt in at a reasonable margin. As I do not hold shares in either mine, I can have no interest in "extolling" one or disparaging the other. I feel confident that "A Country Investor" could, if he were so disposed, throw considerable light upon the interesting subject, and I therefore intend to hope that the arguments contained in his next letter will neither be "sophistically trammelled" or biased by personal interest. I am obliged to "A Shareholder" for correcting me respecting Rhydallog, although the fault actually rests with the management of the mine. I obtained my information from the list of mines furnished in the Journal, and I ask, if a shareholder make a mistake of 8000. or one-third of the market value of Rhydallog, what is there to guide the investing public to form an accurate estimate?—Bishopsgate-street Within, Oct. 7. WM. MARLBOROUGH.

THE QUEBRADA COMPANY.

SIR.—As an advertisement sometimes escapes the notice of the general class of readers of whom shareholders consist, will you oblige me by allowing me among your "Correspondence" to call the attention of those interested in the above company, to the one sent herewith (convening a special meeting on Nov. 2). Short as the time has been since we have received the notice, I have already had several communications by post, and some personal calls from others, all of whom have expressed views entirely in accordance with my own, and, therefore, I earnestly request that those who receive the invitation alluded to in the advertisement will make a point to attend, when having in the mean time considered the Special Resolutions proposed in the notice, we may be prepared to discuss the best means to be adopted at the public meeting to save our property from impending ruin.
FRED. H. HEMMING.
25, Moorgate-street, Oct. 13.

THE MINES OF NEVADA AND CALIFORNIA.

SIR.—The shareholders in the above mines must now see that "all is not gold that glitters," and that there are more "scadders" in the States than the "scadder" so aptly described by Dickens as having drawn a lot of British capital to the Far West, as sure as sun-up." Can it be believed that such an energetic and wealthy nation is unable to find money for the working of their own mines? That they are ready to hand over good mines to foreigners, and above all to Englishmen, who are so unpopular there. History is said to repeat itself, and so does mining. One cannot forget the host of American concerns launched in this country between the years 1845 and 1850—Mariposas, West Mariposas, Yubas, Anglo-Californians, &c., which ended in total loss. There are many native or half-breed sets in Cornwall, especially in the best districts—Redruth, Camborne, St. Agnes, &c.—which invite British capital, where one can go oneself, and see the mines, or employ an inspector, things nearly impossible in the Far West. Hoping that many mines in the last-named districts will soon be worked, I subscribe myself—
AN ADVENTURER.

[For remainder of Original Correspondence see to-day's Journal.]

SOME OBSERVATIONS ON COAL AND COAL MINING, AND THE ECONOMICAL WORKING OF OUR COAL FIELDS.

BY WALTER ROWLEY, MINING ENGINEER, LEEDS.*

As a basis upon which to build the argument of my paper I have selected the Middleton Main seam of coal, as being one of the most important and substantial seams in the whole series, considering the area it occupies, and the average thickness it attains to (nearly 4 ft.) in the Yorkshire coal field. My illustration represents the two generally recognised systems of working that seam, and the figures and deductions that the writer may hereafter make are derived from a personal knowledge of the results actually obtained from the working of it under both systems, in the same district.

For complicity in discussion, and as comprising all we require for the purpose of this paper, I shall condense the various modes of working coal in Yorkshire into two systems—"pillar and stall," and "long wall," with "pack gates," for all the recognised modes of getting coal are but modifications of either one or the other of these two systems.

I shall first refer to "pillar and stall," and here, in passing, it may be interesting to mention that the most primitive mode of getting coal seems to have been associated with this idea, even so far back as the Roman occupation of this country; at any rate, it is recorded on incontestable evidence during the Anglo-Saxon period of the 9th century, where evidence has been collected of the coal having been obtained in the rude form, better described as consisting of getting a piece of coal and leaving a piece alternately. At the same time, in justice to the Romans, who were an exceedingly practical and skilful race, we must remember that they were limited to "basest" workings, and consequently had no other alternative. Had they worked at greater depths, and possessed a proper roof, they would probably have adopted some system of long wall. This historical record is the parent of the present system of pillar and stall, greatly altered and improved, but still retaining the impress of its origin. Hence, perhaps, may arise the reluctance shown by many persons to change a system that has grown with them, and been handed down to them from their forefathers, for one that has been long practised, with uniform success, in the coal fields of Derbyshire and the Midland Counties.

The combination of this system of pillar and stall, as practised in the Yorkshire coal field, may be described as "banks and pillars," as illustrated in my plan representing that method, the distinguishing feature of which consists of getting a certain proportion of the coal, and leaving the remainder as pillars to support the roads, and prevent any movement of the ground or roof of the seam. The coal thus left is either permanently lost, or left until some remote period in the history of the mine, to be either partially or totally removed. In either case the results are equally unsatisfactory, for generally, when it is got afterwards, the length of time that it has borne the pressure of the superincumbent strata renders it almost worthless; being mostly crushed into small coal, it is almost impossible to work such pillars at a profit; hence arises the momentous question, what is the best mode of getting a given seam of coal? upon which decision in opening a colliery depends whether it shall be an absolute loss or a remunerative profit to the owner.

The plan that I have made of pillar workings is, I think, one of the most economical that such a system will admit of, the ventilation having the advantage of supplying each district, or sets of banks, with its own separate portions of air, instead of the objectionable plan of carrying the air round the mine in a single current. On my plan I have coloured the intake air courses yellow, and the return blue, the direction of the ventilation being shown by the arrows, and also marked the necessary air crossings, stoppings, &c. You will notice that the air is passed up the pillar-bord on one side of the bank along the cross-gate, and into the return air-road. I should first have mentioned that the preliminary operations of the mine consist of roads, or endings, being driven in pairs, following the cleavage of the coal at distances varying from 12 to 20 chains, according to the nature of the roof will admit of; and between these endings the coal is got in banks of different widths, varying according to circumstances from 40 to 60 yards; every set of banks consisting of some four or five bords, each about 10 yards wide, out of which the coal is brought, and conveyed along the main bord into the ending leading into the pit bottom; a pillar of coal is left between

* Read at the Geological and Polytechnic Society of the West Riding of Yorkshire. Illustrated with numerous diagrams.

these banks, of about 40 yards in width, which is brought back when the banks are finished. The area of coal occupied in this way in the way of pillar is not less than 50 per cent. of the entire area of the coal field, and the production, instead of being about 6000 tons per acre in the seam now referred to, 4 feet thick, would realise only about 3000 tons of coal, until such time as the pillars are removed. And, again, this system produces a large proportion of slack, or small coal, by reason of the hoing required, and it being got facing the cleavage of the coal; this, with the increase of slack produced in working the pillars, will often raise the percentage of small coal to 40 and even 50 per cent., thus leaving little more than 3000 tons of large coal yielded per acre. You will readily understand what a fearful loss this must be in an extensive colliery, where such coal will only realise in the market from 2s. 6d. to 3s. 6d. per ton; consequently, where there is not a sufficient manufacturing demand at hand, it is found better to save the carriage of it, by leaving a portion in the goaf, along with any other refuse obtained in getting the coal. The refuse in many collieries is very considerable, particularly where the seam of coal is divided by partings of shale and earth. This is an item of very serious trouble and expense in many mines. It would be a great gain to the country if the coal dust we see accumulated in heaps at all large collieries could either, by improved mechanical arrangement, be consumed as coal or manufactured into artificial fuel. The former expedient has been attempted by Mr. Thomas Russell Crampton, at Woolwich, with his coal dust furnace; and the latter alternative by mixing dry pitch with the same, under a process invented by Mr. Chagot, the engineer to some coal mines at Saone-et-Loire, France, both experiments resulting in a fair measure of success. Holing in the coal is at all times productive of much waste, consequently where the ground, or base of the coal, is of a soft nature (more usually so than otherwise) the holings should be made in the seam of under clay, usually existing below the coal.

I now come to the brief consideration of "long wall" workings, illustrated in my plan of that method, the distinguishing feature of which is the extraction of the whole of the coal (after leaving sufficient for the support of the shafts) in the first process of working, by means of long continuous faces. The preliminary operations of this system usually consist of a pair of levels being driven east and west of the shaft, out of which, as the coal proceeds to be got, artificial roads are made, from 30 to 40 yards apart, according to the nature of the roof. These roads are made by being packed on each side with the debris obtained in the getting of coal. The roads are always kept close up to the face; and here it may be remarked that the failure of this system on some occasions where it has been introduced in Yorkshire has arisen solely from these walls not being built in a solid and substantial manner, for unless they are the roads through the goaf and the bank face are sure to be buried, as well as endangering the ventilation. If this be properly done, and with anything like a suitable roof and competent management, I do not fear any failure. At the face of the coal the men are protected by one or two rows of props; and here I may remark, in passing, that these wood props, intended for safety, are often a source of danger, when worked under incompetent or unskilful management, for you may have too many of them as well as too few.

In long wall our object, after securing the safety of the miner, is to let the roof gradually bend down upon the goaf, and throw all possible weight upon the face, to facilitate the economical getting of the coal. As the face of the coal advances the hindermost props are brought forward and the roof let down, the sooner and the better, the longer your face of coal, and of course the greater will be your supply, which can be made very great under this system. But to arrive at perfection in quality as well as quantity, I would in most cases have the coal worked, or broken off, at right angles to its natural cleavage, or as it is commonly called "end working." Those who are not conversant with this end way of getting coal will understand my meaning by examining an ordinary block of wood. If you break it off facing the line of cleavage it produces thin splinters of wood; if broken off at a right angle to its natural formation, or on the end, you obtain large cubical blocks. It is just the same with coal; unless so worked we cannot obtain that maximum quantity of large coal so much to be desired, for instead of 30 to 50 per cent. of slack in bank work, I have known it reduced in one instance, where the coal is riddled in the pit, to under 6 per cent., for the average of one year's workings in long wall, got end way. This increased yield of round coal will far more than compensate for any slight extra cost incurred in getting, which the following figures, calculated from the seam referred to, and proportionately correct, will show to be very slight indeed.

To avoid going over unnecessary commercial ground, I have only calculated the items of cost up to such a stage in the getting of the coal as when the charges become the same under both systems; the following figures, therefore, represent not the actual profit obtained, but only the difference in favour of one system over the other. In working this seam in banks and pillars, I found that 60·88 per cent. of large coal and 39·12 per cent. of slack were obtained, which cost in getting 2s. 1d. per ton. This, taken at the respective sale price of 7s. and 3s. 6d. per ton realised 28½ 2s. 9d.; or an average of 5s. 7·53d. per ton. Working the same seam by long wall, I found that 81·75 per cent. of large coal and 18·25 per cent. of slack was obtained, which cost in getting 2s. 3d. per ton. This at the above sale prices, deducting the slight difference in cost, amounts to 30½ 18s. 7d. per 100 tons. Now, assuming an average weekly production of 3000 tons (which a modern well arranged colliery, where the discipline is good, ought to obtain without any difficulty), we have a difference in favour of long wall of 6·70d. per ton, which is equal to 83½ 15s. per week, or a saving of 4355l. on one year's production.

This is under the results actually obtained, as the writer in his calculations has assumed the same sale price for coal got by both methods; whereas coal got in large cubical blocks (as obtained under this system of long wall on end) is worth at least 6d. per ton more than the same coal got broad way.

In presenting you these returns the writer may possibly be charged with having selected an exceptionally favourable seam; such, however, is not the case, as the Middleton Main is certainly not the most economical coal in the series, so far as concerns its adaptation to long wall workings. I do not say these gratifying results can be obtained in every seam, but I do believe, after a very careful investigation of the subject, that there are few seams where such a system could not be adopted with advantage; and the analyses I have given from results actually obtained in the same bed of coal show what an important part the method employed bears in the economical working of our coal fields.

The ventilation under this system is obtained as follows, and is characterised by its remarkable simplicity. The workings of the pit are divided into districts, to each of which is supplied a separate current of fresh air, which is delivered at the face of the coal, without that waste in its journey which is involved in any system of pillar workings. The air, after passing over the limited district assigned to it, passes into a return, made through the goaf, into these roads. Into these roads there are cross roads from the intake air-courses, to furnish a limited quantity of fresh air, for rendering any obnoxious gases harmless in their passage to the upcast shaft, thus purifying the goaf, without adulterating the air passing along the face of the coal.

All the main roads used in working and for the passage of air should be constructed as large as possible, so as to obtain economical haulage and adequate ventilation. Corners and projections in the sides and roof of the roads should be avoided as much as possible, for if the roof is irregular you will see by observing the line along which air travels, as shown in my illustration, that these cavities above you do not get any ventilation, except by an artificial arrangement of brattice cloth. Carburetted hydrogen gas, being lighter than air, ascends and accumulates in these places; therefore the more regular in shape you can keep your roads the safer and more economical it is. Where returning currents of air join each other, the junction should not be made at right angles, as is usually the case, but effected in the improved manner shown in my illustration, where you will observe that the two currents at the point of junction have both the same direction, and, therefore, assist each other, instead of the objectionable plan of meeting at right angles, where one current must naturally impede the speed of the other.

In pillar and stall workings there is the absence of this valuable

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